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EXAMINER	
ODOM, CURTIS B	
ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/715,487	DOI, YOSHIHARU	
	Examiner	Art Unit	
	CURTIS B. ODOM	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 January 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 5, 6, and 13-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 5, 6, and 13-15 recite limitations such as “computer readable medium encoded with a computer program product." However, the specification does not describe or disclose a "computer readable medium encoded with a computer program product". At most the specification discloses (see page 12, lines 4-10) a recording medium or a computer program as an embodiment of the invention.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim (previously cited in Office Action 12/29/2006) in view of Shiino et al. (previously cited in Office Action 12/29/2006) and in further view of Galperin et al. (US 2004/0008802).

Regarding claim 1, Lim discloses a response characteristic estimation apparatus (see Fig. 2), including:

an input unit (Fig. 2, block 201) which inputs a received signal;

a correlation processor (Fig. 1, block 218) which performs a correlation processing (see column 3, lines 15-24) between the received signal which has been inputted and a known reference training modulation transmission signal;

a phase error estimator (Fig. 1, blocks 210 and 211) which estimates a phase error (difference) of the received signal (see column 3, lines 26-32 and column 58-61), which has been inputted, to the known transmission signal, based on correlation of the received signal which has been inputted and the known training signal.

Lim does not disclose a phase error compensator which estimates a response characteristic of the received signal, which has been inputted, to the known transmission signal by compensating a result of the correlation processing based on the estimated phase error and

Lim further does not disclose the phase error estimator and correlation processor perform operations in parallel (simultaneously).

However, Shiino et al. discloses correlating a known synchronous word with the received signal (see column 3, lines 54-57). The output of the correlation is provided to a phase locked loop which estimates the phase variation (error) of the received signal (see column 4, lines 15-22) based on a transmission channel estimation which is derived from the known synchronous word and the received signal (see column 3, lines 57-61). The phase error is then compensated by a phase rotator (see column 5, lines 21-23) based on the estimation of the transmission channel (response characteristic), (see column 5, lines 10-23). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to compensate for phase error after the correlation in Lim as disclosed by Shiino et al. since Shiino et al. states compensating for the phase can compensate for a frequency offset in the receiver (see column 1, lines 12-18).

Galperin et al. further discloses performing calculation of phase error and correlation level in parallel (or simultaneously), see section 0087. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the apparatus of Lim and Shiino et al. to perform operations in parallel as disclosed by Galperin et al. to increase the processing speed of the apparatus.

Regarding claim 3, the claimed method includes features corresponding to the above rejection of claim 1, which is applicable hereto.

Regarding claim 5, the claimed method includes features corresponding to the above rejection of claim 1, wherein Lim further discloses the method/apparatus embodied as software (see column 3, lines 36-46).

6. Claims 2, 4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim (previously cited in Office Action 12/29/2006) in view of Shiino et al. (previously cited in Office Action 12/29/2006), in view of Galperin et al. (US 2004/0008802) as applied to claims 1, 3, and 5, and in further view of Huttunen (previously cited in Office Action 12/29/2006).

Regarding claims 2, 4, and 6, Lim discloses the known training signal is included in a prescribed interval in the received signal (see Fig. 8) in a sequential manner. Lim, Shiino et al., and Galperin et al. do not disclose the apparatus further includes a controller which detects an end of the sequential interval of the known transmission signal from the received signal which has been inputted, and the phase error compensator compensates the result of the correlation processing based on the estimated phase error at the detected end.

However Huttunen discloses detecting a training sequence of a received signals and instructing a detector to detect the estimate of the channel state over the training sequence (see column 4, lines 40-41. Huttunen further disclose the channel correction and symbol detection can not begin until the training sequence is received (see column 4, liens 37-38). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to instruct the phase error compensator over the entire training sequence in Lim, Shiino et al., and Galperin et al. as disclosed by Huttunen since Huttunen states this ensures the timing of the received signal can be adjusted as accurately as possible (see column 4, lines 37-40).

7. Claims 7, 8, 10, 11, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mody et al. (previously cited in Office Action 12/29/2006) in view of Shiino et al. (previously cited in Office Action 12/29/2006) and in further view of Galperin et al. (US 2004/0008802)

Regarding claim 7, Mody et al. discloses a receiver (see Fig. 1, block 10) including:

an input unit (see Fig. 12) which inputs a plurality of received signal samples respectively;

a correlation processor (Fig. 12, elements 102) which performs cross-correlation processings (see section 0098 and 0100) respectively between each of the plurality of received signals which have been inputted and a known transmitted training signal;

a frequency offset estimator (see section 0090) which estimates a frequency error based on phase output from an auto-correlation, wherein the frequency offset is compensated (see section 0096) the performance of the correlation (synchronization) is dependent upon the frequency offset correction (see section 0102); and

a synthesizing unit (Fig. 12, block 108, section 0100) which synthesizes (adds) results of the correlations which correspond to a frequency offset correction (see section 0102).

Mody et al. does not specifically disclose the frequency offset estimation and synthesizing includes a phase error estimator which estimates a phase error of at least one of the plurality of received signals, which have been inputted, to the known transmission signal based on at least one of the plurality of received signals, which have been inputted, and the known transmission signal; a phase error compensator which generates a plurality of weighting coefficients by compensating respectively a plurality of results of the correlation processings based on the estimated phase error; and the synthesizing unit performs multiplications in a manner that the plurality of received signals which have been inputted respectively correspond to the plurality of weighting coefficients. Mody et al. further does not disclose the phase error estimator and correlation processor perform operations in parallel (simultaneously).

However, Shiino et al. discloses correlating a known synchronous word with the received signal (see column 3, lines 54-57). The output of the correlation is provided to a phase locked loop which estimates the phase variation (error) of the received signal (see column 4, lines 15-22) based on a transmission channel estimation which is derived from the known synchronous word and the received signal (see column 3, lines 57-61). The phase error is then compensated by a phase rotator (see column 5, lines 21-23) based on the estimation of the transmission channel (response characteristic), (see column 5, lines 10-23). The phase rotator multiplies the received signal by a weight of the phase variation (as shown in Fig. 4, block 5) to compensate for phase error, thus the signal corresponds to the weight of the phase variation. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to compensate for phase/frequency error after the correlation in the received signals in Mody et al. as disclosed by Shiino et al. since Shiino et al. states compensating for the phase can also compensate for a frequency offset in the receiver (see column 1, lines 12-18).

Galperin et al. further discloses performing calculation of phase error and correlation level in parallel (or simultaneously), see section 0087. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the apparatus of Mody et al. and Shiino et al. to perform operations in parallel as disclosed by Galperin et al. to increase the processing speed of the apparatus.

Regarding claim 8, Shiino et al. further discloses averaging (integrating) a plurality of phase errors for each received signal (see column 5, lines 9-23 and column 6, lines 9-20). Therefore, it would have been obvious to average the phase errors of each received signal in

Mody et al. as disclosed by Shiino et al. since Shiino et al. states compensating for the phase can also compensate for a frequency offset in the receiver (see column 1, lines 12-18).

Regarding claim 10, the claim includes limitations corresponding to claim 7, which is applicable hereto.

Regarding claim 11, the claim includes limitations corresponding to claim 8, which is applicable hereto.

Regarding claim 13, the claim includes limitations corresponding to claim 7, wherein Mody et al. further discloses the method/apparatus embodied as software (see section 0107).

Regarding claim 14, the claim includes limitations corresponding to claim 8, wherein Mody et al. further discloses the method/apparatus embodied as software (see section 0107).

8. Claims 9, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mody et al. (previously cited in Office Action 12/29/2006) in view of Shiino et al. (previously cited in Office Action 12/29/2006) and in view of Galperin et al. (US 2004/0008802) as applied to claims 7, 10, and 13, and in further view of Huttunen (previously cited in Office Action 12/29/2006).

Regarding claims 9, 12, and 15, Mody et al discloses the known training signal is included in a prescribed interval in the received signal (see Fig. 4, section 0052) in a sequential manner. Mody et al., Shiino et al., and Galperin et al. do not disclose the apparatus further includes a controller which detects an end of the sequential interval of the known transmission signal from the received signals which have been inputted, and the phase error compensator compensates (generates a plurality of weighting coefficients) the result of the correlation processing based on the estimated phase errors at the detected end.

However Huttunen discloses detecting a training sequence of a received signals and instructing a detector to detect the estimate of the channel state over the training sequence (see column 4, lines 40-41. Huttunen further disclose the channel correction and symbol detection can not begin until the training sequence is received (see column 4, lines 37-38). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to instruct the phase error compensator over the entire training sequence in Mody et al., Shiino et al., and Galperin et al. as disclosed by Huttunen since Huttunen states this ensures the timing of the received signal can be adjusted as accurately as possible (see column 4, lines 37-40).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CURTIS B. ODOM whose telephone number is (571)272-3046. The examiner can normally be reached on Monday- Friday, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Curtis B. Odom/
Primary Examiner, Art Unit 2611
April 13, 2008